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| 10/650,258 | 08/27/2003 | Han-Ping Pu | 6319-66761 | 7182 |

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EXAMINER

NGUYEN, DILINH P

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2814

DATE MAILED: 03/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/650,258

Applicant(s)

PU, HAN-PING

Examiner

DiLinh Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 12-20 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 12-14 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art [AAPA] (fig. 1a) (newly cited) in view of Lin (U.S. Pat. 6369451) (previously applied).

- Regarding claims 12 and 18, Applicant Admitted Prior Art disclose an electronic package comprising:

a device carrier composed of a metal surface 82 and a lead frame 101 enclosed by the metal surface; at least a semiconductor unit 21 including at least an electrode; at least an interconnection portion 31, wherein the interconnection portion directly contacts the metal surface and the semiconductor unit, wherein the interconnection portion is surrounded by the metal surface and the interconnection portion is sealed by the metal surface 82 and the semiconductor unit 21 (fig. 1a).

AAPA does not disclose the interconnection portion including two parts, first and second parts respectively have an end on the metal surface, the end of second part is surrounded the end of the first part, and the second part is wrapped by the first part, the first part has a melting point lower than that of the second part, and the first part adheres to the second part.

However, Lin disclose an electronic package comprising:

at least a semiconductor unit 220 including at least an electrode; and at least an interconnection portion including a first part and a second, wherein the second part directly contacts the metal surface and the semiconductor unit, both the first part and the second part span between and tie together the metal surface and the semiconductor unit, the first part and the second part respectively have an end on the metal surface, the end of the second part is surrounded by the end of the first part, the second part is wrapped by the first part, the first part has a melting point lower than that of the second part, and the first part adheres to the second part (fig. 3C, column 5, lines 1-15).

Therefore, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device structure of AAPA by having the interconnection portion including two parts, first and second parts respectively have an end on the metal surface, the end of second part is surrounded the end of the first part, and the second part is wrapped by the first part, the first part has a melting point lower than that of the second part, and the first part adheres to the second part because as taught by Lin, such the cover part would provide the core balls with unchanged in their original shapes (column 5, lines 12-13).

- Regarding claim 13, AAPA discloses that the interconnection portion 31 electrically connects the metal surface and the semiconductor unit (fig. 1a). Lin discloses that the interconnection portion electrically connects the metal surface and the semiconductor unit 220 (fig. 3C).

- Regarding claim 14, AAPA (fig. 1a) and Lin (fig. 3C) disclose that the

interconnection portion mechanically connects the metal surface and the semiconductor unit.

- Regarding claims 16-17, AAPA discloses that one side of the lead frame 101 faces semiconductor unit 21 and is fully covered by one part of the metal surface 82, the part of the metal surface is flat and the metal surface is exposed (fig. 1a).
- Regarding claim 19, Lin discloses that the first part contains materials (column 5, lines 6-7) by which the solder wettability between the first part and the second part is controlled by the second part (fig. 3C, column 5, lines 6-7).
- Regarding claim 20, Lin discloses that the first part has an end partially contacting the electrode of the semiconductor unit 220 and partially contacting an area which is part of the semiconductor unit 220 and which surrounds the electrode of the semiconductor unit 220 (fig. 3C).

3. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art [AAPA] (fig. 1a) in view of Lin (U.S. Pat. 6369451) (previously applied) and further in view of Grigg (U.S. Pat. 6506671) (previously applied).

AAPA and Lin substantially disclose all the limitations as claimed above. Lin also discloses that the first part contains more tin than lead (fig. 3C, column 5, lines 6-7). AAPA and Lin do not explicitly disclose the second part contains more lead than tin.

However, Grigg discloses an electronic package comprising a plurality of solder bumps, wherein the solder bumps contain more lead than tin (column 1, lines 37-41). Therefore, it would have been obvious to one having ordinary in the art at the time the

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invention was made to modify the device structure of Lin by having the bump contains more lead than tin because as taught by Grigg, such the bump contains more lead than tin is well know in the art to improve the reliability for flip chip, ball grid array and chip-scale packaging type attachments.

Response to Arguments

Applicant's arguments with respect to claims 12-20 have been considered but are moot in view of the new ground(s) of rejection. Please see the above new ground of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN



HOAI PHAM
PRIMARY EXAMINER